

Game Theory Intro

Game Theory Course:
Jackson, Leyton-Brown & Shoham

More General Form

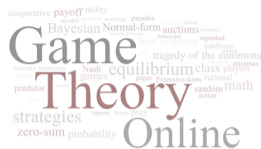


Prisoner's dilemma is any game

	<i>C</i>	<i>D</i>
<i>C</i>	a, a	b, c
<i>D</i>	c, b	d, d

with $c > a > d > b$.

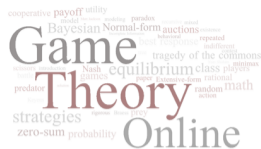
Games of Pure Competition



Players have **exactly opposed** interests

- There must be precisely two players (otherwise they can't have exactly opposed interests)
- For all action profiles $a \in A$, $u_1(a) + u_2(a) = c$ for some constant c
 - Special case: zero sum
- Thus, we only need to store a utility function for one player
 - in a sense, we only have to think about one player's interests

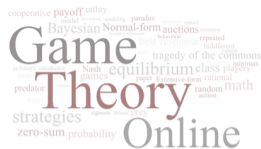
Matching Pennies



One player wants to **match**; the other wants to **mismatch**.

	Heads	Tails
Heads	1, -1	-1, 1
Tails	-1, 1	1, -1

Rock-Paper-Scissors



Generalized matching pennies.

	Rock	Paper	Scissors
Rock	0, 0	-1, 1	1, -1
Paper	1, -1	0, 0	-1, 1
Scissors	-1, 1	1, -1	0, 0

...Believe it or not, there's an annual international competition!

Games of Cooperation



Players have **exactly the same** interests.

- no conflict: all players want the same things
- $\forall a \in A, \forall i, j, u_i(a) = u_j(a)$
- we often write such games with a single payoff per cell
- why are such games “noncooperative”?

Coordination Game



Which **side of the road** should you drive on?

	Left	Right
Left	1, 1	0, 0
Right	0, 0	1, 1

General Games: Battle of the Sexes



The most interesting games combine elements of **cooperation** and **competition**.

	B	F
B	2, 1	0, 0
F	0, 0	1, 2